WHAT IS CLAIMED IS

1. A transfer module for passing a small portion of a high flow rate primary stream of dissolved analytes to a secondary path leading to an analyzer for analysis of the analyte, comprising:

a stator having a pair of primary stator passages and a pair of secondary stator passages;

a shuttle that has an aliquot passage with opposite end portions, said shuttle being movable between first and second positions relative to said stator;

said opposite end portions of said aliquot passage are each aligned with at least one of said primary stator passages in said first shuttle position and said aliquot passage opposite end portions are each aligned with a different one of said secondary stator passages in said second shuttle position, to thereby move a sample of fluid flowing along said primary stream into said secondary path.

2. The transfer module descried in claim 1 wherein:

said shuttle has a flowthrough shuttle passage that is positioned with its opposite end portions each aligned with one of said secondary stator passages when said shuttle is in said first shuttle position.

3. The transfer module described in claim 1 including:

a bypass that has a large enough cross-section to pass fluid therethrough at a flow rate that is a plurality of times the flow rate through said aliquot passage for the same pressure drop across them;

said bypass connecting said primary passages in series, and connecting said aliquot passage in parallel with said primary passages when said aliquot passage lies in said first shuttle position and said bypass continuing to flow fluid

through said primary passages in series when said aliquot passage does not lie in said first position.

4. The transfer module described in claim 1 wherein:

a first (172) of said primary passages has a first proximal end that is closest to said shuttle, said first proximal end having highflow and lowflow end parts, and the second of said primary stator passages has a second proximal end with highflow and lowflow second proximal end parts;

said shuttle has a highflow passage that is aligned with said first and second highflow end parts in both said first and second shuttle positions, and said aliquot passage opposite end portions are aligned with said lowflow end parts of said primary stator passages in said first shuttle position.

5. The transfer module described in claim 1 wherein:

said stator includes a single stator part having a proximal stator face, with both of said primary passages and both of said secondary passages open at said proximal stator face, and said shuttle has a proximal shuttle face that lies facewise adjacent to said proximal stator face;

said aliquot passage opposite end portions each lies at said proximal shuttle face and are spaced apart thereat, with each of said aliquot passage end portions aligned with at least one of said primary passages in said first shuttle position, and with each of said aliquot passage ends aligned with a different one of said secondary passages in said second shuttle position.

6. The transfer module describe in claim 5 wherein:

said stator forms a bypass that connects together said pair of primary passages, with said bypass open at said proximal stator face, and with said

aliquot passage end portions each open to said bypass in said first shuttle position.

7. The transfer module described in claim 1 including:

a source of high pressure fluid that includes a mixture of said analytes with a mobile phase fluid, said source connected to a first of said primary stator passages;

an analyte receiver which includes a plurality of containers for receiving said analytes, said receiver connected to a second of said primary stator passages;

a source of pressured carrier fluid connected to a first of said secondary stator passage to pump said carrier fluid therein, and an analyzing instrument connected to the other secondary stator passage to receive a sample of said analytes in largely carrier fluid from said aliquot passage.

8. The transfer module described in claim 1 wherein:

a powered switching actuator that is mechanically connected to said shuttle and that repeatedly moves said shuttle back and forth between said first and second shuttle positions.

9. The transfer module described in claim 8 including:

said actuator is constructed to repeatedly move said shuttle between said positions at a rate that is on the order of magnitude of one movement back and forth between said shuttle positions per second.

10. Apparatus for transferring a small portion of a primary stream that comprises at least some of the combination of mobile phase fluid and

dissolved analytes passing out of a preparative chromatographic column or similar separating device toward a receiver, to a mass spectrometer or similar analyzing device whose inlet flow rate must be a small fraction of a flow rate of said primary stream, comprising:

an analyte mass rate attenuator which includes a transfer module, a secondary stream pump means which pumps a secondary stream, a carrier tube connecting said secondary stream pump means to said transfer module, a transfer tube connecting said transfer module to said analyzing device, a primary stream tube connecting said primary stream to said transfer module, and a main path outlet for carrying away most of said primary stream to said receiver;

said transfer module includes a stator and a shuttle, where said stator and said shuttle have at least one pair of adjacent surfaces;

said secondary stream pump means is constructed to pump a carrier fluid at a flow rate that can be less than 10% of the flow rate along said primary stream;

said stator has a first primary passage coupled to said primary stream and has a second primary passage coupled to said main path;

said stator has first and second secondary passages coupled respectively to said carrier tube and to said transfer tube;

said shuttle is moveable between first and second positions and has an aliquot passage with opposite end portions;

said transfer module includes means for flowing fluid from said first primary passage to said aliquot passage to fill it when said shuttle lies in said first position, and for coupling said aliquot passage to said secondary passage to allow said secondary stream to pump at least part of the contents of said aliquot passage along said transfer tube, when said shuttle

lies in said second position.

11. The apparatus described in claim 10 wherein:

said first and second primary passages merge in said stator at a bypass that opens to one of said surfaces of said shuttle, and said secondary passage has opposite ends that both lie on said one of said surfaces of said shuttle.

12. The apparatus described in claim 10 wherein:

said stator has two stator parts that each has a face, and said shuttle has two faces each lying facewise against a different one of said stator faces, said shuttle having a high flow passage;

each of said stator parts has a channel connected to one of said primary passages and having a lowflow end part that lies at a face of the corresponding stator part and that is aligned with an end of said aliquot passage in said first position, and each primary passage has a highflow end part aligned with said high flow passage in both said first and second shuttle positions.

13. A transfer module for passing a small portion of a high flow rate primary stream of dissolved analytes, to a secondary path for flow of the small portion to an analyzer for analysis of the analytes, comprising:

A stator having a pair of primary stator passages and a pair of secondary passages;

a shuttle that has an aliquot passage with opposite end portions, said shuttle being moveable between first and second positions relative to said stator;

said stator has a single proximal stator face and said shuttle has a single proximal shuttle face that lies facewise against said proximal stator face;

said opposite end potions of said aliquot passage are each open at said proximal shuttle face;

said stator has a bypass where said stator passages are connected together to flow most of the fluid in said primary stream from one to the other of said primary passages without all of said fluid reaching said proximal stator face, but with said bypass being open to said proximal shuttle face to flow some of the fluid in said primary stream to said aliquot passage in said first position of said shuttle;

said secondary passages have proximal ends that open at said proximal stator face, and said opposite ends of said aliquot passage are each connected with a different one of said secondary passage proximal ends in said second shuttle position.

14. The transfer module described in claim 13 wherein:

said shuttle has a plurality of different aliquot chambers with said aliquot passage forming a first of said aliquot chambers, said aliquot chambers having different volumes;

said shuttle is moveable between third and fourth positions relative to said stator, with a second of said aliquot chambers having a portion aligned with said bypass in said third shuttle position, and with said second chamber having opposite end portions aligned with said secondary passage proximal ends in said fourth position of said shuttle.

15. A method for flowing a portion of a primary stream of dissolved analytes to an analyzing device, comprising:

flowing at least a portion of said primary stream into a first primary passage of a stator;

positioning an aliquot passage of a shuttle that lies in a first shuttle position, in communication with said first primary passage and flowing a portion of fluid flowing into said primary passage, to said aliquot passage to at least partially fill said aliquot passage;

moving said shuttle to a second shuttle position relative to said stator to move said aliquot passage to a second aliquot passage position in communication with first and second secondary passages, and pumping fluid lying in said aliquot passage toward said analyzing device when said shuttle lies in said second position.

16. The method described in claim 15 wherein:

said stator has a second primary passage and said stator has a single proximal stator face;

said step of flowing a portion of fluid to said aliquot passage to fill it, includes flowing fluid from said first primary passage to said second primary passage through a bypass connection that is open to said aliquot passage in said first position thereof.

17. The method described in claim 15 wherein:

said stator has at least one stator face and said shuttle has at least one shuttle face that lies facewise against said at least one stator face, said aliquot passage having first and second opposite end portions each opening to said at least one shuttle face;

said step of flowing a portion of fluid to said aliquot passage includes flowing fluid from said first primary passage into said first end of said aliquot passage and through said aliquot passage to a second end of said aliquot passage that opens to said at least one stator face and through a second primary passage of said stator, while said aliquot passage lies in said first position.

09835785.041801